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## COTYPE, SYNTYPE, AND OTHER TERMS REFERRING TO TYPE MATERIAL

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As indicated by Joseph Ewan in a recent note in *Chronica Botanica* (7: 8-9. 1942), the term "cotype" has been wrongly used by some botanical writers to designate specimens of the type collection of a species (or other taxonomic unit) other than the actual type. The definition of "cotype" which Ewan cites from Hitchcock (*Science* n. s. 21: 832. 1905), a specimen "cited with the original description in addition to the type specimen," is also incorrect on the basis of the original definition of the term and subsequent extensive usage, and seems to have led some botanists astray. The word "cotype" (written with the superfluous hyphen) was apparently first proposed in print by Oldfield Thomas in 1893 (*Proc. Zool. Soc.* 1893: 241-242). In this short but important paper, in which he sought to clarify terms relating to type material, he stated: "Already, as a step towards this end, the word 'co-type' has been introduced<sup>1</sup> for any specimen which was one of several forming the basis of the original description; but, like 'type,' it has become loosely and vaguely used for different sorts and classes of specimens, and equally needs definition and pinning down to one particular class, for which alone it should be used." He then gave these definitions (p. 242): "A *Co-type* is one of two or more specimens together forming the basis of a species, no *type* having been selected. No species would have both type and co-types, but either the former, or

<sup>1</sup> I believe in the first case by my colleague Mr. C. O. Waterhouse.

two or more of the latter." "A *Para-type* is a specimen belonging to the original series, but not the type, in cases where the author has himself selected a type. It should, however, be one of the specimens mentioned or enumerated in the original description." The anonymous editor of *Natural Science*, in an article entitled "Scientific Volapuk," altered "co-type" to "syntype" on puristic grounds (*Natural Science* 4: 57. 1894). F. A. Bather (l. c. 4: 160. 1894) and Charles Schuchert and S. S. Buckman (*Ann. & Mag. Nat. Hist.* VII. 16: 103. 1905) concurred in this change, but Schuchert, in his important catalogue of type specimens of fossil invertebrates in the U. S. National Museum, published in the same year (1905), used exclusively the term cotype (*Bull. U. S. Nat. Mus.* 53<sup>1</sup>: 11 (definition) and throughout the text).

The correction of "cotype" to "syntype" has sometimes been attributed to Bather, but this is incorrect; the change was made by the anonymous editor of "*Natural Science*." In any case, it is an unnecessary one. *Typus* is a perfectly good Latin word, derived of course from the Greek τύπος, and Thomas (or Waterhouse) was guilty of no etymological hybridization in using the form "cotype." The fact that essentially all other terms of this nature are derived from Greek words in conjunction with "type" does not affect the validity of this term. The additional fact that the word has been misused in two different ways by botanical authors is no compelling reason for abandoning it. Have we any assurance that such authors will use syntype correctly?

The nature of type material in botany differs from that in zoology in three principal respects. In general, botanists collect several or many individuals or fragments of a given species in the same spot at the same time and distribute them to herbaria under a given number. For practical purposes (except in the case, relatively very uncommon at least in vascular plants, of mixture of two or more species in collecting) these specimens are equivalent, and the citation of collectors' numbers in a monograph or an original description provides a ready means for the identification of specimens in herbaria not examined by the monographer or describer. The designation of a specimen of *Smith* 1234 in a given herbarium as the type of a new species makes that number wherever represented the type collection.

The existence of duplicate type material (isotypes: see below) is consequently very common in botany, with attendant beneficial results in taxonomy. The precise equivalent is scarcely known to zoologists, although its place is taken more or less satisfactorily by topotypes.

In the second place, when the zoologist speaks of a type (or holotype, if he uses that word) he practically always refers to a single specimen of the organism he is dealing with. When the botanist cites a type, he ordinarily refers to a sheet of mounted material (vascular plants) or a pocket containing one to many individuals of a moss, lichen, or fungus, or a mounted slide bearing one to many individuals of a microscopic form. Since a type proper (holotype) is by definition an individual specimen, it follows that the type sheet or pocket or slide, when it bears more than one individual or parts of individuals is not a holotype but a group of cotypes. Ordinarily these are conspecific, but sometimes they are not, and it then becomes necessary for some student, recognizing the true state of affairs, to select a single specimen as lectotype, or at least to clarify the case by excluding the material not belonging to the species as restricted by him. The situation then is just as it is when it becomes necessary to select a type from several specimens of different collections cited in the description of a new species by an author writing in the days before the designation of types had become established.

A third difference of considerable practical importance is found in the fact that botanical specimens, generally speaking, are metameristic in nature while zoological specimens are not, except in some of the lower forms such as bryozoa and corals. The animal specimen is an entity and cannot suffer the loss of any of its parts without irreparable damage. The plant specimen, in very many cases, bears so many flowers, fruits, and leaves that fragments can be spared for deposit in other herbaria, and these fragments showing the distinctive technical characters, particularly if accompanied by a photograph, not only make it possible for the distant monographer to make certain of the identity of the plant in question but for practical purposes multiply the type and afford a safeguard against its accidental or purposive destruction—a consideration not without significance in A. D. 1943.

Of the multitude of terms that have been proposed relating to type material, conveniently summarized by D. L. Frizzell in 1933 ("Terminology of types," *American Midland Naturalist* **14**: 637-668), very few are really necessary in actual practice. Frizzell lists 233 altogether (including different usages of the same term), but recommends the general use of only 10, of which one (genotype) refers to a species and not to a specimen. For ordinary botanical usage, six would seem to be sufficient, and most of these will be used but seldom.

In practice, we may expect botanical authors to use the word "type" to designate the actual physical unit of preparation with which they are dealing (a sheet bearing one or several mounted specimens, a pocket of mosses or lichens, a mounted slide of microscopic forms), leaving to subsequent students the selection of a holotype when the growth of knowledge makes this necessary; and we may hope that they will agree on the use of "isotype" for duplicate specimens of the type collection. The other terms defined below will scarcely be needed except in critical discussions.

**HOLOTYPE.** The single specimen (or fragment) upon which a species or other form is based. For systematic botanical work the *type* of ordinary usage is a practical although not a strict equivalent.

**COTYPE.** Any specimen of the author's original material (when more than one) when no type was designated. *Syntype* of some authors.

**PARATYPE.** Each of the specimens other than the type upon which an original description is based. *Cotype* of some botanists (incorrectly). The term "paratype" applies only to specimens actually examined by the describer; duplicates of a paratype in other herbaria would properly be designated not as paratypes, but as of the paratype collection. (The practice current among entomologists of selecting some of the specimens cited in the original description, frequently not from the type locality, for designation as "paratypes" is obviously based on a misunderstanding of the proper meaning of the word. All the specimens, except the type, used in preparing the original description become paratypes automatically.)

**ISOTYPE.** Any specimen of the type collection other than the actual type. This term, introduced by F. W. Pennell in 1919 (*Torreyia* **19**: 13) is omitted from Frizzell's paper, although he gives the same word as used by Gill in 1881 in a zoogeographical sense. Specimens of the type collection actually used in the preparation of the original description (= "protolog" of Schuch-



Photo. B. G. Schubert.

HELENIMUM AUTUMNALE, var. CANALICULATUM, all figs.  $\times 1$  (except FIG. 5): FIG. 1, portion of plant of Hortus Cliffortianus, courtesy of Dr. John Ramsbottom; FIG. 2, summit of wild specimen from Quebec; FIG. 3, portion of original plate of *H. canaliculatum*; FIGS. 4 and 5, portions of Cornut plate